

Initiative #4: Understanding and Planning for Climate Impacts on Operations, Assets, and the Environment

SO 8: Increase Predictability of Weather Impact on, Intermittent Resources, Climate Risks, and Load

INITIATIVE DESCRIPTION

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- Advances the climate and weather forecasting, modeling, and data capabilities needed to understand how evolving climate hazards affect electric system operations, assets, and planning decisions.
- Integrates advanced weather analytics, climate projections, asset condition modeling, and risk assessment tools to improve visibility into operational climate risks and future system vulnerabilities.
- Connects climate observations and forecasts with utility planning and operational processes, enabling more informed decisions on grid hardening, resilience investments, and day-to-day grid operations.
- Together, the proposed RD&D develops the data resources, modeling tools, and analytical capabilities needed to improve climate-risk prediction, forecasting accuracy, and climate-informed grid planning.

PROPOSED INITIATIVE BUDGET	\$4,525,000
% OF TOTAL BUDGET (excl. admin & overhead)	5.00%
# OF RESEARCH TOPIC AREAS	1

ALIGNMENT SUMMARY

STRATEGIC OBJECTIVE ALIGNMENT

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“By 2030, the EPIC program will conduct data analysis and develop and/or advance data resources, modeling tools, and technologies to measurably improve: a) predictions to electric system operational climate risk; b) intermittent electric resource supply forecasts and electricity demand forecasts under climate uncertainty; c) open-access data on grid equipment condition and capability; and d) coordination between weather and climate observation/projections, forecasting, and grid operations.”

Develops the data resources, modeling tools, and technologies needed to improve operational climate-risk prediction, climate-informed load forecasting, utility grid asset condition visibility, and coordination between climate observations, forecasting, and grid operations.

CPUC ALIGNMENT

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- CPUC climate adaptation, wildfire mitigation, and risk assessment processes increasingly require improved forecasting, climate-risk modeling, and long-term planning tools to evaluate future system vulnerabilities under changing climate conditions.
- Initiative 4 develops weather, climate, fire, asset-condition, and risk-analysis capabilities needed to inform future decisions related to grid hardening, resilience investments, wildfire mitigation, and climate adaptation planning.
- Produces utility-scale data, models, and analytical methods that improve forecasts of climate-driven operational risk, load impacts, and asset vulnerability while strengthening climate projection-informed utility decision-making.
- EPIC is appropriate because these utility-specific forecasting, asset, and climate-risk capabilities require validation using utility data, systems, and operating environments before broader implementation.

4.1 Enhancing climate and weather analytics to reduce systemic risk

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WHAT PROBLEM ARE WE SOLVING?

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PG&E's ability to plan for intensifying climate hazards is constrained by incomplete data and models that lack current climate trajectories and cannot anticipate how compounding stressors will reshape grid risk, asset performance, tree health, and catastrophic event likelihood. This RTA addresses that gap by advancing more granular, reliable weather forecasting and climate analytics better integrated into utility planning. In doing so it directly advances SO 8 by strengthening the near-term forecasting and data systems that drive day-to-day operations while sharpening how PG&E sizes, sequences, and targets its largest grid-hardening investments.

Understanding and Planning for Climate Impacts on Operations, Assets, and the Environment

START	2027-2028
OUTPUTS	2029-2032
MARKET READY	2030-2033

ALIGNMENT SUMMARY

WHAT IS THE DISTINCT RESEARCH APPROACH?

- Advances enhanced microscale weather forecasting, wind gust modeling, climate-adjusted asset failure modeling, and wildfire analytics to improve predictions of climate-driven operational risks and grid vulnerabilities.
- Integrates AI/ML-enhanced downscaled climate projections, weather observations, asset-condition data, and hazard analytics into utility planning and operational decision-making, strengthening the connection between climate science and grid operations.
- Develops novel approaches for compound hazard analysis, wildfire and urban conflagration modeling, community survivability assessment, and climate-adjusted asset lifecycle and risk analytics for targeted grid hardening.
- Gaps Addressed p. 64

HOW WILL YOU KNOW YOU ARE SUCCESSFUL?

- Validated forecasting, climate-risk, and asset-condition modeling tools that improve operational visibility into weather, wildfire, and climate-driven system risks.
- Integrated climate and weather analytics that inform grid planning, wildfire mitigation, resilience investments, and day-to-day operational decisions.
- **Primary outcome:** Improved climate risk prediction and climate-informed decisions through validated weather, hazard, and asset-risk analytics. **Metrics:** Reduced weather and fire forecasting error, and improved asset-failure prediction accuracy
- Metrics and Impact Assessment p. 65

HOW WILL YOU COORDINATE?

- CEC foundational climate science, data and analytical tools with statewide applicability, can be leveraged in PG&E's utility-specific applications and regionally specific datasets and tools for localized risk analysis; IOUs will coordinate to identify opportunities for complementary work during project ideation. (Coordination p.66).
- Builds on EPIC 1.05 (3km hourly weather forecasting for fire and storm prediction) and EPIC 4.34 (urban/WUI conflagration risk modeling), advancing both toward AI/ML-enhanced forecasting and statewide approaches (Leveraging Past RD&D p.65).
- Leverages CEC-funded climate data and tools, including the Cal-Adapt Analytics Engine and CEC fire/weather modeling (Pyregence, Spatial Informatics Group, LLNL) (Leveraging Past RD&D p.65).